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# **Addition of Electrostatic Forces to EDEM with Applications to Triboelectrically Charged Particles**

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## **Abstract**

Tribocharging of particles is common in many processes including fine powder handling and mixing, printer toner transport and dust extraction. In a lunar environment with its high vacuum and lack of water, electrostatic forces are an important factor to consider when designing and operating equipment. Dust mitigation and management is critical to safe and predictable performance of people and equipment. The extreme nature of lunar conditions makes it difficult and costly to carryout experiments on earth which are necessary to better understand how particles gather and transfer charge between each other and with equipment surfaces. DEM (Discrete Element Modeling) provides an excellent virtual laboratory for studying tribocharging of particles as well as for design of devices for dust mitigation and for other purposes related to handling and processing of lunar regolith. Theoretical and experimental work has been performed pursuant to incorporating screened Coulombic electrostatic forces into EDEM<sup>TM</sup>, a commercial DEM software package. The DEM software is used to model the trajectories of large numbers of particles for industrial particulate handling and processing applications and can be coupled with other solvers and numerical models to calculate particle interaction with surrounding media and force fields. In this paper we will present overview of the theoretical calculations and experimental data and their comparison to the results of the DEM simulations. We will also discuss current plans to revise the DEM software with advanced electrodynamic and mechanical algorithms.